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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Kazumasa Tanida

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EXAMINER

ARROYO, TERESA M

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/594,561	Applicant(s) TANIDA ET AL.	
	Examiner TERESA M. ARROYO	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,6 and 7-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,6 and 7-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 03/05/10 have been fully considered but they are not persuasive. Applicants argue: "neither Sunohara nor Toyosawa include any teaching or suggestion of an opening that has a greater width than that of the semiconductor chip when seen from above, or when seen from more than one direction. FIG. 3H of Sunohara and FIG. 2(b) of Toyosawa both show only side views in cross section, i.e. views similar to the above FIG. 2C of the present invention."

2. In response, Applicants Figures show only side views in cross section as well. Accordingly, since claims 1 and 6 recite: "is viewed from vertically above," and Applicants argue that this claim terminology "instead define the viewing direction for the respective comparisons of size and distance," Examiner maintains the rejection that the claim language is indefinite and additionally requests a drawing that illustrates these features.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "insulating film having an opening greater in size than the semiconductor chip when the surface of the solid state device facing the semiconductor chip is viewed from vertically above;..., wherein a difference in level caused by the opening is not located in a gap between the solid state device and the semiconductor chip" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 8-15 are objected to because of the following informalities: Additional text appears after each of newly added claims 8-15 that does not seem to be part of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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6. Claims 1, 2, 4, 6, 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Regarding claims 1, 6, the two occurrences of the phrase "when the surface of the solid state device facing the semiconductor chip is viewed from vertically above " renders the claim indefinite because it is unclear whether the limitation(s) preceding the phrase are part of the claimed invention. See MPEP § 2173.05(d).

8. The terminology: "wherein a difference in level caused by the opening is not located in a gap between the solid state device and the semiconductor chip" is not understood as to what Applicants are claiming. It is confusing whether the "level" is the height of each element or there is a difference in the height of the underfill.

9. The other claims are rejected as being dependent on an indefinite base claim.

Claim Rejections - 35 USC § 103

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claims 1, 2, 4, 7-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent Pub. No. 20050067715 to Sunohara in view of US Patent Pub. No. 20040108594 to Toyosawa.

12. Regarding claim 1, Sunohara discloses a semiconductor device, comprising:
a solid state device 10;
a semiconductor chip 26 having a functional surface on which a functional element 26a is formed, the semiconductor chip 26 being bonded on a surface of the

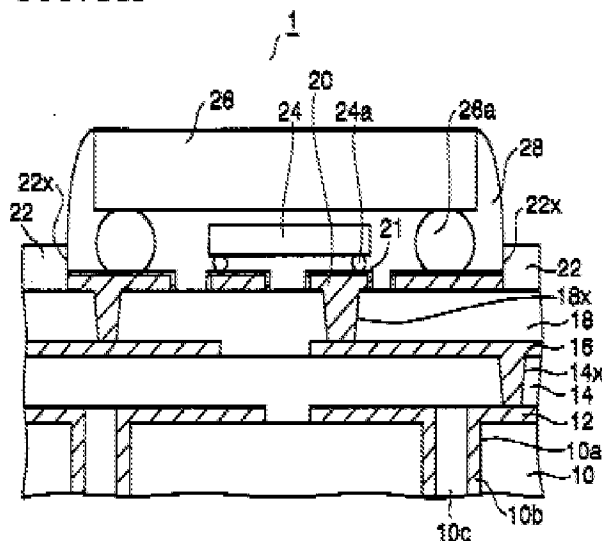
solid state device 10 with the functional surface thereof facing the surface of the solid state device 10 while maintaining a predetermined distance between the functional surface thereof and the surface of the solid state device 10;

an insulating film 22 provided on the surface of the solid state device 10 facing the semiconductor chip 26, the insulating film 26 having an opening greater in size than the semiconductor chip 26 when the surface of the solid state device 10 facing the semiconductor chip 26 is viewed from vertically above; and

a sealing layer 28 that seals a space between the solid state device 10 and the semiconductor chip 26.

It appears that Fig. 3H below “when viewed from above” includes an opening between the edge of insulating film 22 and the edge of semiconductor chip 26 that is greater in size than the semiconductor chip 26 although there is no top view.

FIG. 3H



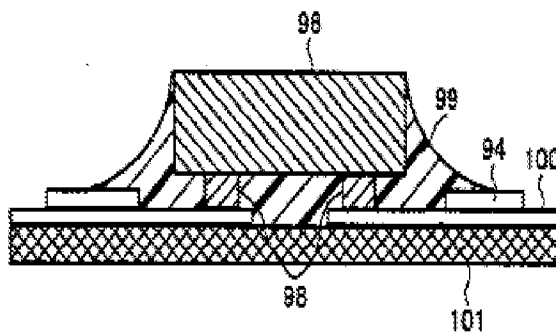
13. However, Sunohara does not disclose a pillar-shaped connecting member configured to connect the functional surface of the semiconductor chip to the surface of

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the solid state device 10, a width of the pillar-shaped connecting member being constant.

14. Toyosawa teaches a pillar-shaped connecting member 98 for connecting a semiconductor chip 96 and a solid state device 101. The width is constant at 24 μm in para. [0135]. Further, Toyosawa teaches a sealing layer 99.

FIG. 2 (b)



15. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a pillar-shaped connecting member having a constant width in Sunohara such as taught by Toyosawa in para. [0046] since determining the optimum shape/width would have only involved routine skill in the art as discussed in the legal precedent below.

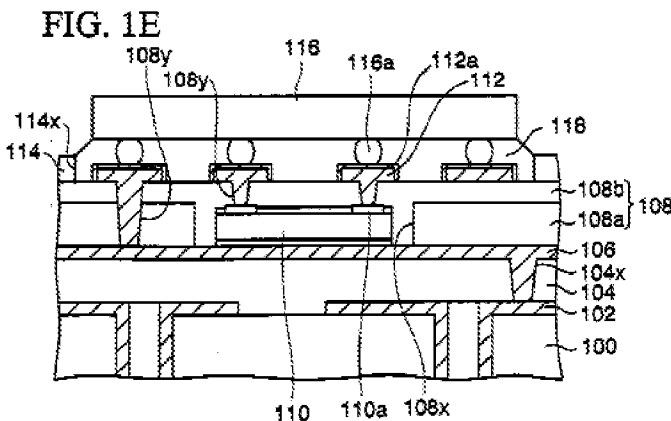
16. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (The court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant.).

17. Regarding claim 2, in both references wherein the sealing layer is provided in such a manner as to fill the opening with the sealing layer.

18. Regarding claim 4, Toyosawa teaches wherein the pillar-shaped connecting member is formed by bonding a connection pad 100 provided on the solid state device 101 and a projection electrode 98 provided on the semiconductor chip 96.

19. Regarding claim 7, both references teach wherein the semiconductor chip is connected in a flip chip manner.

20. Regarding claim 8, Sunohara disclose wherein the sealing layer covers the semiconductor chip up to a lower level than an upper end of a side surface of the semiconductor chip. (See Fig. 1E.) In addition, Toyosawa shows the same features above in Fig. 2(b).



21. Regarding claim 9, Toyosawa teaches wherein the solid state device 101 is a wiring board formed by being wired on an insulating substrate in para. [0045].

22. Regarding claim 10, Sunohara discloses wherein the solid state device 100 is a semiconductor substrate in para. [0005].

23. Regarding claim 11, Sunohara discloses wherein the insulating film 114 and 22 is a solder resist.

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24. Regarding claim 12, Toyosawa teaches wherein a connection pad 100 is formed on a surface of the wiring board 101, the surface of the wiring board 101 opposing to the semiconductor chip 96.

25. Regarding claim 13, it appears that Toyosawa teaches wherein the connection pad 100 has a rectangular shape which does not seem to be significant.

26. In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (The court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant.).

27. Regarding claim 14, it appears that Toyosawa teaches wherein the solder resist 94 has a thickness smaller than an interval between the semiconductor chip 96 and a surface of the solid state 101 device opposing thereto, the solid state device 101 being a wiring board.

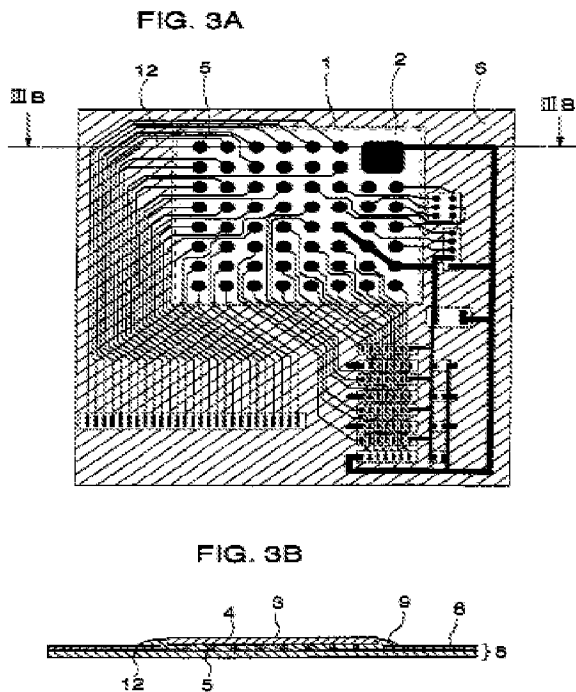
28. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sunohara in view of Toyosawa as applied to claim 1 above, and further in view of US Patent No. 6,281,450 to Urasaki et al.

29. Regarding claim 6, the combination of references fails to teach wherein a distance between an outer periphery of the semiconductor chip and an edge of the opening of the insulating film is 0.1 mm or more when the surface of the solid state device facing the semiconductor chip is viewed from vertically above.

30. Urasaki et al. teach wherein a distance between an outer periphery (1) (boundary of the chip mounting area) of the semiconductor chip (3) and an edge (2) (boundary of

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the insulating coating) of the opening of the insulating film (6) (insulating coating) is 0.1 mm or more (boundary 2 of the insulating coating 6 is preferably within a range of up to 300 μm from the boundary 1 of the semiconductor chip mounting area) when the surface of the solid state device (8) facing the semiconductor chip (3) is viewed from vertically above.



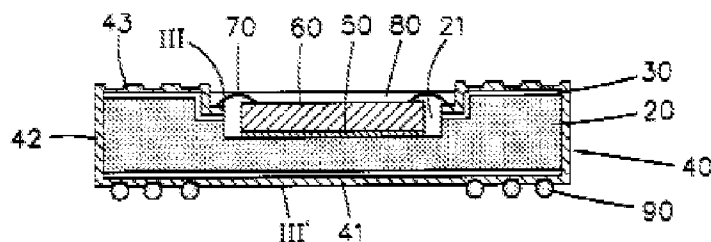
31. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use such a distance in Sunohara since if this boundary-to-boundary distance exceeds 300 μm , the wiring conductors 12 may not be completely covered with the adhesive 9, causing a reduction of insulation reliability as taught by Urasaki et al. in col. 4, lines 31-34.

32. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sunohara in view of Toyosawa as applied to claim 9 above, and further in view of US Patent No. 6,172,423 to Lee.

33. Regarding claim 15, the combination of Sunohara and Toyosawa fails to teach wherein an electrode is formed at an end of the wiring board.

34. Lee teaches an electrode 42 formed at an end of a wiring board 20.

FIG. 2



35. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use an electrode at an end of the wiring board in the modified device of Sunohara to manufacture a package with multiple layers of semiconductor packaged as taught by Lee in the Background.

Conclusion

36. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TERESA M. ARROYO whose telephone number is (571) 272-7260. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. M. A./
Examiner, Art Unit 2826

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/Leonardo Andújar/
Primary Examiner, Art Unit 2826